IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE
BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE PATENT APPLICATION OF:	**Hongyu YUE**
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EXAMINER	CHEN, KIN C.
FOR:	TOKYO ELECTRON LIMITED

- APPEAL BRIEF UNDER 37 C.F.R. §41.37 -

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Date: March 7, 2007

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Commissioner for Patents
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Dear Sir:

Further to the Notice of Appeal, filed on December 7, 2006, the Notice of Panel Decision from Pre-Appeal Brief Review dated January 9, 2007, and the Final Office Action of June 7, 2006, Appellants respectfully submit this Appeal Brief pursuant to 37 C.F.R. §41.37, the date for submitting being set by the Notice of Panel decision to January 9, 2007 and being extended by one (1) month to March 9, 2006, by the corresponding petition and fee.

The Director is authorized to charge the $500.00 fee for filing an Appeal Brief pursuant to 37 C.F.R. §41.20(b)(2). The Director is further authorized to charge any additional fees that may be due or credit any overpayment of same to Deposit Account No. **03-3975** (Ref. No. 071469-0307699).

- REQUIREMENTS OF 37 C.F.R. § 41.37 -

I.   37 C.F.R. § 41.37(c)(1)(i) – REAL PARTY IN INTEREST

The real party in interest for this Appeal and the present application is TOKYO ELECTRON LIMITED by way of an Assignment recorded in the U.S. Patent Trademark Office at Reel/Frame: 015505/0387.

II.   37 C.F.R. § 41.37(c)(1)(ii) - RELATED APPEALS AND INTERFERENCES

There are presently no appeals or interferences known to the Appellants, the Appellants' representatives or the Assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III.   37 C.F.R. § 41.37(c)(1)(iii) - STATUS OF CLAIMS

Pending: Claims 1-5 and 7-15 are pending.

Withdrawn: Claims 14-15 has been withdrawn.

Rejected: Claims 1-5 and 7-13 stand rejected.

Cancelled: Claim 6 has been cancelled.

Allowed: No claims have been allowed.

On Appeal: Claims 1-5 and 7-13 are being appealed. Of the claims on Appeal, claims 1 and 13 are the sole independent claims. The claims on Appeal are set forth in the attached Appendix.

IV.   37 C.F.R. § 41.37(c)(1)(iv) - STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Office Action of June 7, 2006.

V. 37 C.F.R. § 41.37(c)(1)(v) - SUMMARY OF CLAIMED SUBJECT MATTER

Independent claims 1 and 13, as described below, include references and citations to the specification, drawings, and reference numerals. Such description is intended to facilitate an understanding of the claims by the Board Members and is not intended as a comprehensive claim construction, such as used in the context of an argument of invalidity or infringement. Any reference to more than one reference number or character for any particular claimed element or limitation *is illustrative only and is not to be construed as an admission* that the claims are limited to any, or all, of the particularly disclosed embodiments.

Independent claim 1, as it currently stands, sets forth the following:

1. A method for achieving a target trim amount of a feature on a substrate in a chemical oxide removal process (*FIG. 20: item 900, page 31, lines 13-15; see also, FIG. 15: item 800, page 22 line 17 – page 24, line 26; see also, page 6, lines 8-13*) comprising:

performing a chemical oxide removal process using a process recipe (*FIG. 15: item 820, page 22 lines 26 –32; see also, page 6, lines 8-13*) including a first reactant, a second reactant, an inert gas and a process pressure (*page 24, line 27 – page 25, line 2; see also, page 28, lines 14-25*) in order to acquire trim amount data as a function of a variable parameter, while maintaining at least one constant parameter constant (*FIG. 20, item 910, page 31, lines 13-20; FIGs. 16, 17, 18, 19; page 25, line 26 – page 28, line 14; page 28, line 26 – page 31, line 20*), wherein said variable parameter is one of a first group of parameters including an amount of said first reactant, an amount of said

second reactant, and a process pressure, and said at least one constant parameter different from said variable parameter is one of a second group of parameters including an amount of said first reactant, an amount of said second reactant, and a process pressure (*page 29, lines 9 – 22; page 30, lines 2 – 10; page 30, lines 21-31*);

determining a relationship between said trim amount data and said variable parameter (*FIG. 20, item 920; page 31, lines 21-23*);

using said target trim amount and said relationship to determine a target value for said variable parameter (*FIG. 20, item 930; page 31, lines 24-25*);

chemically treating said feature on said substrate by exposing said substrate to said process recipe using said target value of said variable parameter and said at least one constant parameter (*FIG. 20, item 940; page 31, lines 26-28*); and

substantially removing said target trim amount from said feature (*FIG. 20, item 950; page 31, lines 29-31*).

Independent claim 13, as it currently stands, sets forth the following:

13. A method for performing a chemical oxide removal process using a process recipe to achieve a target trim amount of a feature on a substrate (*FIG. 20: item 900, page 31, lines 13-15; see also, FIG. 15: item 800, page 22 line 17 – page 24, line 26; see also, page 6, lines 8-13*) comprising:

determining a relationship between trim amount data and a partial

pressure of a gas specie and an inert gas for said process recipe (*FIG. 20,*

item 920; page 31, lines 21-23; see also, FIGs. 18, 19; page 30, lines 2 – page

31, line 20);

setting said target trim amount (*page 30, lines 15-20; page 31, lines 3-8*);

using said relationship and said target trim amount to determine a target

value of said partial pressure of said gas specie and said inert gas (*FIG. 20,*

item 930; page 31, lines 24-25);

adjusting said process recipe according to said target value for said

partial pressure of said gas specie and said inert gas (*page 29, lines 23-30*);

and

chemically treating said feature on said substrate by exposing said

substrate to said process recipe (*FIG. 20, item 950; page 31, lines 29-31*).

VI.   37 C.F.R. § 41.37(c)(1)(vi) – GROUNDS OF REJECTION TO BE REVIEWED

The grounds of rejection submitted for review are those identified in the Final

Office Action, as follows:

> (a) the rejections of claims 1-5 and 7-13, under 35 U.S.C. §103(a), as
> allegedly being unpatentable over Tomoyasu '583 (U.S. Patent
> Application Publication No. 2004/0185583);

> (b) the rejections of claims 1-3 and 7-13, under 35 U.S.C. §103(a), as
> allegedly being unpatentable over Natzle '047 (U.S. Patent
> Application Publication No. 2004/0097047) in view of Tomoyasu '583

or <u>Newton '377</u> (U.S. Patent Application Publication No. 2004/0099377); and

(c) the rejections of claims 4 and 5, under 35 U.S.C. §103(a), as allegedly being unpatentable over <u>Natzle '047</u> in view of <u>Tomoyasu '583</u> or <u>Newton '377</u> and further in view of <u>Doris '981</u> (U.S. Patent Application Publication No. 2004/0241981).

VII.   37 C.F.R. § 41.37(c)(1)(vi) - ARGUMENT

To be clear and to the point, the prior art rejections are improper and must fail for two reasons. First, the Examiner has not presented a *prima facie* case of obviousness with respect to the claims. Second, none of the asserted references, whether taken alone or in combination, teach or suggest the entire claimed combination of elements. Accordingly, Appellant respectfully traverses the rejections set forth by the Examiner.

As a preliminary matter, Appellant respectfully points out that "[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there *must be some suggestion or motivation*, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) *must teach or suggest all the claim limitations*." *(See*, M.P.E.P. §2143)(*emphasis added*). As a corollary to this requirement, the Federal Circuit has specifically held that the mere fact that *the prior art could be modified* as proposed by the Examiner *is not sufficient* to establish a *prima facie* case of obviousness. *(See, In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) *(emphasis added)*. Rather, the Examiner *must explain why the prior art would have suggested* to one of ordinary skill in the art *the desirability of the modification*. *(See Fritch*, 972 F.2d at 1266, 23 USPQ2d at 1783-84) *(emphasis added)*. As will be evident

by the following discussion, Appellant respectfully submits that a *prima facie* case of obviousness has not been established.

Appellant further submits that, at the very least, none of the asserted references teach or suggest (a) performing a chemical oxide removal process using a process recipe including a *first reactant, a second reactant, an inert gas and a process pressure* in order to *acquire trim amount data as a function of a variable parameter*, while maintaining at least one constant parameter constant, wherein the variable parameter is one of a first group of parameters including an amount of the first reactant, an amount of the second reactant, and a process pressure, and the at least one constant parameter is different from the variable parameter is one of a second group of parameters including an amount of the first reactant, an amount of the second reactant, and a process pressure, (b) *determining a relationship between the trim amount data and said variable parameter*, and (c) using the target trim amount and the relationship to determine a target value for the variable parameter, as required by claim 1.

Nor is there anything in the asserted references that teach or suggest (a) *determining a relationship between trim amount data and a partial pressure of a gas specie and an inert gas* for said process recipe, (b) *setting the target trim amount*, and (c) *using the relationship and said target trim amount to determine a target value of the partial pressure of the gas specie and the inert gas*, as required by claim 13.

A. Claims 1-5 and 7-13 Are Not Obvious Over <u>Tomoyasu '583</u>

The Examiner asserted that <u>Tomoyasu '583</u> renders claims 1-5 and 7-13 unpatentable as the reference allegedly teaches or suggests each and every claim element. Appellants respectfully submit that these rejections are woefully unsupported. In particular, the grounds of rejections rest squarely on the Examiner's assertions that <u>Tomoyasu '583</u> teaches the use of first and second reactants and combinations thereof (<u>Tomoyasu '583</u>: par. [0200]) and the setting of an amount of an inert gas in order to

achieve the trim amount (Tomoyasu '583: par. **[0007]**). (*See*, Final Office Action, page 3). The Examiner further asserted that Tomoyasu '583 teaches adjusting one or more chemical processing parameters and that such disclosure reads on the claimed maintaining at least one constant parameter constant. (*See*, Final Office Action: pages 9-10). Such assertions are either inaccurate or simply miss the point.

In particular, Tomoyasu '583 discloses a method of operating a processing system **150** to treat a substrate that includes, *inter alia*, performing at least one of setting, monitoring, and adjusting one or more chemical processing parameters for the chemical treatment system, wherein the one or more chemical processing parameters comprise at least one of a chemical treatment processing pressure, a chemical treatment chamber temperature, a chemical treatment gas distribution system temperature, a chemical treatment substrate temperature, a chemical treatment substrate holder temperature, and a chemical treatment gas flow rate. (*See*, Tomoyasu '583: par. **[0007]**).

Tomoyasu '583 teaches that processing subsystem **150** includes a Chemical Oxide Removal (COR) module **154** and a Post Heat Treatment (PHT) chamber **156**. The COR module **154** performs the first step of the COR process, which is a reaction between a mixture of process gases, such as HF and ammonia gases, and silicon dioxide that forms a solid reaction product on the wafer surface. The PHT module **156**, performs the second step of the COR process, which causes the evaporation of the solid reaction product by heating the wafer. (*See*, Tomoyasu '583: par. **[0052]**).

Tomoyasu '583 further discloses that a predicted state for the wafer may be computed based on the input state, the process characteristics, and a process model. For example, a trim rate model can be used along with a processing time to compute a predicted trim amount. Alternately, an etch rate model can be used along with a processing time to compute an etch depth, and a deposition rate model can be used along with a processing time to compute a deposition thickness. Other models identified by Tomoyasu

'583 include SPC charts, PLS models, PCA models, FDC models, and MVA models. (*See*, Tomoyasu '583: par. **[0074]**). The process model may also provide input parameters for gas flow rate ratios, for example, the R2R controller can calculate and establish a gas flow ratio and adjust the total flow of the combined gases. (*See*, Tomoyasu '583: par. **[0088]**).

With this said, Applicant remains at a loss as to how these disclosures (*i.e.*, the adjustment of one or more chemical processing parameters, trim rate modeling techniques, and processing times) can be construed to correspond to the specific recitations of *acquiring of trim amount data as a function of a variable parameter, while maintaining at least one constant parameter constant*, wherein the variable parameter is one of a first group of parameters including an amount of the first reactant, an amount of the second reactant, and a process pressure, and the at least one constant parameter is different from the variable parameter is one of a second group of parameters including an amount of the first reactant, an amount of the second reactant, and a process pressure and *determining a relationship between the trim amount data and said variable parameter*, as required by claim 1. Or, for that matter, how such disclosures can be construed to correspond to the specific recitations of *determining a relationship between trim amount data and a partial pressure of a gas specie and an inert gas* for said process recipe and *using the relationship and said target trim amount to determine a target value of the partial pressure of the gas specie and the inert gas*, as required by claim 13.

In other words, there is no discussion or suggestion in Tomoyasu '583 of a first reactant, a second reactant, an inert gas, and a process pressure to acquire trim amount data as a function of a variable parameter while maintaining at least one constant parameter constant and to determine a relationship between the trim amount data and said variable parameter, as specifically required by claim 1. Nor is there any discussion of a relationship between trim amount data and a partial pressure of a gas specie and an inert gas, nor is there any discussion of using the relationship to determine a target value of the partial pressure of the gas specie and the inert gas, as specifically required by claim 13. Appellant

cautions that the mere discussion of different modeling techniques even when coupled with a listing of gases that can make up the process gas, *cannot* be said to lead those skilled in the art to the relationships specifically recited by the present claims without some additional discussion or suggestion. Appellant respectfully submits that the absence of any correlation between specifically-recited variables such as a first reactant, a second reactant, an inert gas, a process pressure, partial pressure of a gas specie, or partial pressure of an inert gas clearly undermines the Examiner's assertions..

With regard to the use of inert gases, and in contrast to the Examiner's cited passages, the few instances in which <u>Tomoyasu '583</u> actually mentions the use of an "inert gas" (*e.g.*, argon) is in connection with the orifice configurations of the gas distribution system and the possible use of a heat transfer gas. That is, <u>Tomoyasu '583</u> discloses that the first and second arrays of one or more orifices **1444, 1448** are configured to distribute gas, which can, for example, comprise NH_3, HF, H_2, O_2, CO, CO_2, Ar, He, *etc.* (*see*, <u>Tomoyasu '583</u>: par. **[0200]**) and that a heat transfer gas may be delivered to the back-side of substrate **1242** via a backside gas system to improve the gas-gap thermal conductance between substrate **1242** and substrate holder **1240** (*see*, <u>Tomoyasu '583</u>: par. **[0195]**). The heat transfer gas supplied to the back-side of substrate **1242** can comprise an inert gas such as helium, argon, xenon, krypton, a process gas such as CF_4, C_4F_8, C_5F_8, C_4F_6, *etc.*, or other gas such as oxygen, nitrogen, or hydrogen.

It should be clear that such descriptions fail to teach or suggest the specific use of a *first reactant, a second reactant, an inert gas* and a process pressure in order to *acquire trim amount data as a function of a variable parameter*, as required by claim 1. Nor does it teach or suggest determining a relationship between trim amount data and a partial pressure of a gas specie *and an inert gas* for the process recipe and using the relationship and said target trim amount to determine a target value of the partial pressure of the gas specie *and the inert gas*, as required by claim 13.

For at least these reasons, Appellants submit that the Examiner has not presented a *prima facie* case of obviousness with respect to independent claims 1 and 13 and that these claims are not rendered obvious by Tomoyasu '583. As such, claims 1 and 13 are clearly patentable. Moreover, because claims 2-5 and 7-12 depend from claims 1 and 13, respectively, claims 2-5 and 7-12 are also patentable at least by virtue of dependency as well as for their additional recitations.

B. Claims 1-3 and 7-13 Are Not Obvious Over Natzle '047 In View of Tomoyasu '583 Or Newton '377

The Examiner asserted that Natzle '047 renders claims 1-3 and 7-13 unpatentable by alleging that the reference teaches a chemical oxide removal process using a process recipe including a first a reactant, a second reactant, and a process pressure. The Examiner acknowledged that Natzle '047 fails to teach the use of an inert gas and, therefore, relied on Tomoyasu '583 or Newton '377 as allegedly teaching such a feature. (*See*, Final Office Action: page 7). Appellant strenuously disagrees.

Natzle '047 discloses the use of a pre-cleaning step by introducing a CMOS device **10** into a Chemical Oxide Removal (COR) chamber **44**, which employs gas phase reactants (*e.g.*, HF and NH_3) to perform a self-limiting etch that is adjustable by controlling the parameters in the COR chamber **44**. (*See*, Natzle '047: par. [0037]). Natzle '047 also discusses the adjustment of the amount of HF and NH_3 to allow shaping of the curved silicon oxide **18**. (*See*, Natzle '047: par. [0051]). Natzle '047 further discloses that the completion of the reaction and the amount of the gate dielectric layer **14** and the reoxidized silicon oxide layer **18** that are removed is a function of the substrate temperature, composition and residence time of the adsorbed reactant film **20**. Factors influencing the amount removed per unit time include the vapor pressure of the reactant at the temperature of the substrate **12**, the amount of reactant or the rate of reactant admitted to the COR chamber **44**, the pumping speed of pump **60**, and the reaction rate between the adsorbed

reactant film **20** and the reoxidized silicon oxide layer **18** to be etched. (*See*, Natzle '047: par. [0042]).

Appellant points out, however, that the mere discussion of an adjustment of the amount of specific gases or a discussion of general factors that influence the removal of oxide per unit time, without any discussion of a specific interaction between the variables, *cannot* support the Examiner's assertions. The deficiency lies in the absence of any correlation between specific factors.

Moreover, as admitted by the Examiner, there is nothing in Natzle '047 that remotely teaches or suggests the use of inert gases. And, for the reasons noted above, Tomoyasu '583 is incapable of curing these deficiencies. That is, both Natzle '047 and Tomoyasu '583 clearly fail to teach or suggest the specific use of a *first reactant, a second reactant, an inert gas* and a process pressure in order to *acquire trim amount data as a function of a variable parameter*, as required by claim 1. Nor do these references teach or suggest determining a relationship between trim amount data and a partial pressure of a gas specie *and an inert gas* for the process recipe and using the relationship and said target trim amount to determine a target value of the partial pressure of the gas specie *and the inert gas*, as required by claim 13.

With regard to Newton '377, this reference is directed to an apparatus and method that provides controlled etching of an adapted surface layer of a workpiece or wafer by reaction of the adapted surface layer with ammonium bifluoride (NH_5F_2), forming a self-limiting etchable layer, ammonium hexafluorosilicate, ((NH_4)$_2SiF_6$), that may be removed by thermal desorption, in which NH_5F_2 may be formed by mixing a first fluid, ammonia (NH_3) and a second fluid, hydrogen fluoride (HF). (*See*, Newton '377: par. [0026]).

Newton '377 discloses a chamber **7** that includes a sandwich **119** of an electrostatic chuck **110**, and upper annular ring **103**, a cathode insulator **105**, and a lower annular ring **125** that contains a plurality of exhaust holes **127** for distributing an exhaust flow provided

by a vacuum pump through the exhaust port **83**. The exhaust flow that originates from the exhaust port 83 and distributed through the plurality of exhaust holes **127** of the lower annular ring **125**, resulting in a uniform or homogeneous atmosphere of reactive fluids over the workpiece **30** in the chamber **7**. (*See*, Newton '377: par. **[0050]**; FIG. 4).

Newton '377 further discloses that "reactive fluids" refer to the first fluid, the second fluid, in which the first or second fluids may be ammonia (NH_3) or hydrogen fluoride (HF) and ammonium bifluoride (NH_5F_2) and combinations thereof. Providing the reactive fluids over the adapted surface layer **32** of the workpiece **30**, as a uniform or homogeneous atmosphere, forms the self-limiting etchable layer **50** that includes layers made of materials such as ammonium hexafluorosilicate (($NH_4)_2SiF_6$), that may become impervious to continued exposure to hydrogen fluoride (HF). Such imperviousness is the basis for the layer **50** being a self-limiting etchable layer. (*See*, Newton '377: par. **[0050]**; FIG. 4).

Regarding the use of inert gases, Newton '377 merely discloses that fluid feed lines **97**, **99** or chamber **7** may be optionally provided with Ar or N_2 gas. (*See*, Newton '377: par. **[0034]**, **[0073]**).

Appellant fails to comprehend as to how the mere mention of these gases would somehow lead those skilled in the art to understand or determine the nature of the relationship between the trim amount and the amount of an inert gas, among other claimed features. In other words, like Tomoyasu '583, there is no discussion in Newton '377 of a first reactant, a second reactant, an inert gas, and a process pressure to acquire trim amount data as a function of a variable parameter while maintaining at least one constant parameter constant, as required by claim 1. Nor is there a discussion of a relationship between trim amount data and a partial pressure of a gas specie and an inert gas, nor is there any discussion of using the relationship to determine a target value of the partial pressure of the gas specie and the inert gas, as required by claim 13.

For at least these reasons, Appellants submit that the Examiner has not presented a *prima facie* case of obviousness with respect to independent claims 1 and 13 and that these claims are not rendered obvious by Natzle '047 in view Tomoyasu '583 or Newton '377. As such, claims 1 and 13 are clearly patentable. Moreover, because claims 2-5 and 7-12 depend from claims 1 and 13, respectively, claims 2-5 and 7-12 are also patentable at least by virtue of dependency as well as for their additional recitations..

C. Claims 4-5 Are Not Obvious Over Natzle '047 In View of Tomoyasu '583 Or Newton '377 And Doris '981

Lastly, the Examiner alleged that claims 4-5 are unpatentable over Natzle '047 in view of Tomoyasu '583 or Newton '377 and Doris '981. Appellant disagrees.

Appellant substantially relies on the reasons presented above regarding the patentability of independent claims 1 and 13. That is, the Doris '981 reference does not assist the Examiner with a rejection of the claims because it suffers from the same deficiencies noted with respect to Tomoyasu '583 and Natzle '047. While Doris '981 does describe heating the structure and rinsing the structure in water, it provides no discussion, whatsoever, of a correlation between specific variables such as a first or second reactant, an inert gas, a process pressure, partial pressure of a gas specie, and partial pressure of an inert gas to support the Examiner's rejection of the claims. Thus, based on the aforementioned reasons, Appellants respectfully submit that claims 4-5, which depend from claim 1, are also patentable at least by virtue of dependency as well as for their additional recitations.

VIII.   **37 C.F.R. §41.37(c)(1)(viii) - CLAIMS APPENDIX**

APPENDIX A: The pending claims (claims 1-22 and 24-30) are attached.

IX.   **37 C.F.R. §41.37(c)(1)(ix) - EVIDENCE APPENDIX**

APPENDIX B: (NONE)

X.   **37 C.F.R. §41.37(c)(1)(x) - RELATED PROCEEDINGS INDEX**

APPENDIX C: (NONE)

XI.   **CONCLUSION**

For at least the foregoing reasons, it is respectfully submitted that claims 1-29 are not rendered obvious, under 35 U.S.C. §103(a), by the asserted references. Appellants, therefore, respectfully request this Honorable Board to reverse the rejection of these claims and direct that the claims be passed to issue.

Date: **March 7, 2007**   Respectfully submitted,

By: _____

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1. A method for achieving a target trim amount of a feature on a substrate in a chemical oxide removal process comprising:

performing a chemical oxide removal process using a process recipe including a first reactant, a second reactant, an inert gas and a process pressure in order to acquire trim amount data as a function of a variable parameter, while maintaining at least one constant parameter constant, wherein said variable parameter is one of a first group of parameters including an amount of said first reactant, an amount of said second reactant, and a process pressure, and said at least one constant parameter different from said variable parameter is one of a second group of parameters including an amount of said first reactant, an amount of said second reactant, and a process pressure;

determining a relationship between said trim amount data and said variable parameter;

using said target trim amount and said relationship to determine a target value for said variable parameter;

chemically treating said feature on said substrate by exposing said substrate to said process recipe using said target value of said variable parameter and said at least one constant parameter; and

substantially removing said target trim amount from said feature.

2. The method of claim 1, wherein said performing said chemical oxide removal process using said process recipe includes a variable parameter selected from the group consisting of a partial pressure of a first reactant, a partial pressure of a second reactant, a process pressure, a mole fraction of said first reactant, and a mole fraction of said second reactant, and at least one constant parameter different from said variable parameter selected from the group consisting of said partial pressure of said first reactant, said partial pressure of said second reactant, said process pressure, said mole fraction of said first reactant, said mole fraction of said second reactant, a mass fraction of said first reactant to said second reactant, a mole ratio of said first reactant to said second reactant; a mass of said first reactant, a mass of said second reactant, a mass flow rate of said first reactant, a mass flow rate of said second reactant, a number of moles of said first reactant, a number of moles of said second reactant, a molar flow rate of said first reactant, and a molar flow rate of said second reactant.

3. The method of claim 1, wherein said amount of said first reactant includes one of a partial pressure of said first reactant, a partial pressure of said second reactant, a process pressure, a mole fraction of said first reactant, and a mole fraction of said second reactant, and said at least one constant parameter different from said variable parameter is one of a second group of parameters including said partial pressure of said first reactant, said partial pressure of said second reactant, said process pressure, said mole fraction of said first reactant, said mole fraction of said second reactant, a mass fraction of said first

reactant to said second reactant, a mole ratio of said first reactant to said second reactant, a mass of said first reactant, a mass of said second reactant, a mass flow rate of said first reactant, a mass flow rate of said second reactant, a number of moles of said first reactant, a number of moles of said second reactant, a molar flow rate of said first reactant, and a molar flow rate of said second reactant.

4. The method of claim 1, wherein said substantially removing of said trim amount from said feature comprises thermally treating said substrate by elevating the temperature of said substrate following said chemical treating.

5. The method of claim 1, wherein said substantially removing of said trim amount from said feature comprises rinsing said substrate in a water solution following said chemical treating.

6. (*Cancelled*).

7. The method of claim 2, wherein said first group of parameters further includes a partial pressure of said inert gas, and said second group of parameters further includes a partial pressure of said inert gas, a mole fraction of said inert gas, a mass of said inert gas, a mass flow rate of said inert gas, a number of moles of said inert gas, a molar flow rate of said inert gas, a mass ratio of said first reactant to said inert gas, a mass ratio of said second

reactant to said inert gas, a mole ratio of said first reactant to said inert gas, and a mole ratio of said second reactant to said inert gas.

8. The method of claim 1, wherein said performing of said chemical oxide removal process includes using a process recipe including HF gas, NH_3 gas, and Ar gas.

9. The method of claim 8, wherein said acquiring of said trim data as a function of said variable parameter for said constant parameter includes acquiring said trim data as a function of a partial pressure of HF for a constant value of a mass ratio of HF to NH_3, and said process pressure.

10. The method of claim 1, wherein said chemically treating of said feature includes chemically treating a silicon oxide feature.

11. The method of claim 1, wherein said determining of said relationship includes at least one of interpolation, extrapolation, and data fitting.

12. The method of claim 10, wherein said data fitting includes at least one of polynomial fitting, exponential fitting, and power law fitting.

13. A method for performing a chemical oxide removal process using a process recipe to achieve a target trim amount of a feature on a substrate comprising:

determining a relationship between trim amount data and a partial pressure of a gas specie and an inert gas for said process recipe;

setting said target trim amount;

using said relationship and said target trim amount to determine a target value of said partial pressure of said gas specie and said inert gas;

adjusting said process recipe according to said target value for said partial pressure of said gas specie and said inert gas; and

chemically treating said feature on said substrate by exposing said substrate to said process recipe.

14. (*Withdrawn*): A system for achieving a target trim amount on a substrate in a chemical oxide removal process comprising:

a chemical treatment system for altering exposed surface layers on said substrate by exposing said substrate to a process recipe having an amount of a first process gas, an amount of a second process gas, an amount of an ~~optional~~ inert gas, and a process pressure for an exposure time;

a thermal treatment system for thermally treating said chemically altered surface layers on said substrate; and

a controller coupled to said chemical treatment system and configured to use a relationship between trim amount and a variable parameter for one or more constant parameters, wherein said variable parameter is one of a first group of parameters including said amount of said first reactant, said amount of said second reactant, said amount of said inert gas, and said process pressure, and said one or more constant parameters different from said variable parameter is one of a second group of parameters including said amount of said first reactant, said amount of said second reactant, said amount of said ~~optional~~ inert gas, and said process pressure.

15. (*Withdrawn*): The system of claim 14, wherein said variable parameter is selected from the group consisting of a partial pressure of said first reactant, a partial pressure of said second reactant, a process pressure of said first reactant, said second reactant, and said inert gas, a mole fraction of said first reactant, and a mole fraction of said second reactant, and said one or more constant parameters are selected from the group consisting of said partial pressure of said first reactant, said partial pressure of said second reactant, said process pressure of said first reactant, said second reactant, and said inert gas, said mole fraction of said first reactant, said mole fraction of said second reactant, a mass fraction of said first reactant to said second reactant, a mole ratio of said first reactant to said second reactant; a mass of said first reactant, a mass of said second reactant, a mass flow rate of said first reactant, a mass flow rate of said second reactant, a number of moles

of said first reactant, a number of moles of said second reactant, a molar flow rate of said

first reactant, and a molar flow rate of said second reactant.

- 37 C.F.R. §41.37(c)(1)(ix): APPENDIX B (EVIDENCE APPENDIX) -

(NONE)

- 37 C.F.R. §41.37(c)(1)(x): APPENDIX C (RELATED PROCEEDINGS INDEX) -

(NONE)